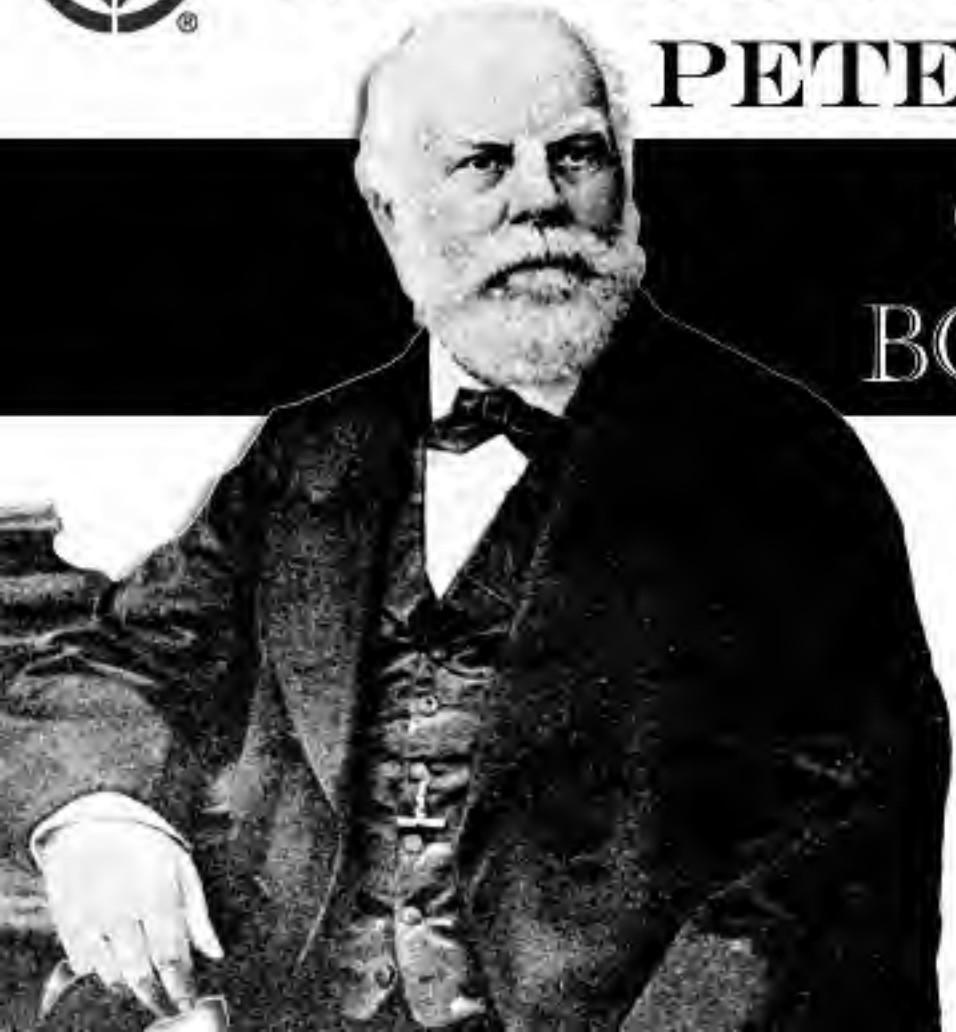




# MISSOURI BOTANICAL GARDEN

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## GEORGE ENGELMANN BOTANICAL NOTEBOOKS

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*Additional Remarks on ATMOSPHERIC ELECTRICITY.*

By A. WISLIZENUS, M.D.

The delay in the publication of this volume enables me to add to my observations of atmospheric electricity in 1861, the result of my observations in 1862. The latter observations have been made in the same manner and by means of the same fine glass thread, which, after many thousand torsions, proves as good as ever. I present herewith in tabular form the general result of my observations in 1861 and 1862.

I. *Monthly mean of Positive Atmospheric Electricity in 1861 and 1862, at St. Louis, Mo., based upon daily observations at 6, 9, 12, 3, 6 and 9 o'clock, from morning till night.*

Jan.	Feb.	Mar.	Ap'l.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean of Year.
1861*.16.5	12.1	9.8	8.8	7.8	4.0	3.7	3.4	3.0	7.1	10.0	14.3	8.4
1862...12.1	16.0	9.4	10.6	7.5	3.0	2.2	2.3	3.0	7.7	12.6	13.9	8.4

\* This table of 1861 differs in some decimals from that published on page 66 and in Diagram No. 1. Having discovered some errors, I calculated all my observations once more, and give now the present as the corrected table.

II. *Monthly mean of Temperature and of Relative Humidity in*

1861 AND 1862 AT ST. LOUIS.



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116 TRANS. OF THE ACAD. OF SCIENCE.

IV. *Direction of Winds and number of Thunderstorms in '61 & '62.*

1861.							Prevailing Winds.	Thunderstorms.	
	E.	N.	N.E.	S.W.	N.W.	S.	W.		
January.....	11	3	12	22	38	18	28	61 S.E. ....	0
February....	4	2	2	35	24	19	41	60 S.E. ....	2
March.....	12	11	10	23	30	19	42	40 W. & S.E. ....	3
April .....	16	10	9	26	21	35	34	26 S. & W. ....	2
May .....	26	10	23	21	8	13	49	35 W. & S.E. ....	5
June .....	12	21	22	20	25	26	8	41 S.E. ....	7
July .....	3	31	14	21	26	46	15	29 S. ....	3
August .....	18	24	58	17	11	18	3	37 N.E. ....	5
September...	6	14	18	26	30	13	21	52 S.E. & N.W. ....	3
October....	12	9	5	21	30	33	30	46 S.E. & S. ....	1
November...	7	15	8	22	27	20	36	44 S.E. & W. ....	1
December ...	9	19	9	25	23	33	17	51 S.E. & S. ....	0
	136	169	190	279	293	293	324	522 S.E. ....	32
1862.	E.	S.W.	N.	N.E.	W.	S.	N.W.	S.E. Prevailing Winds.	Th. st's.
Jan.....	19	6	19	23	29	3	38	51 S.E. ....	1
Feb.....	14	9	18	16	22	7	39	43 S.E. & N.W. ....	0
March ...	9	14	3	15	59	10	34	43 W., S.E. & N.W. ....	4
April ...	12	13	18	31	18	11	34	47 S.E., N.W. & N.E. ....	6
May....	12	18	14	38	18	30	14	44 S.E. & N.E. ....	5
Jn"	3	29	1					S., S.W., N.W. & S.E. ....	



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Ex Herb. J. Engelm.

*Wolffia Columbiiana*, Karst.

submersa, major, sphacelata, grandicellulosa  
color, stomatibus paucissimis; riva tenuis-  
simu margine obscuriore vincta; et

*Wolffia Brasiliensis*, Wedd.

var. borealis

natura, minor, oblonga, ante subarata, pari-  
cellulosa, densior, supra lacte viridis, subsus  
pallida, plus minus bruno-maculata, stoma-  
tibus plurimis; riva tenuis, color (si  
vestigialiter compressa) vel margin'e exparsive  
recte obscuriore (si a latere compressa).

In lacu quadam inter Springfield et  
Athens in Illinois centrali, abunde cum  
Lemnus, Ceratophyllum, Anacharis, etc.

leg. Elihu Hall, Sept. 1867.



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Ex Herb. G. Engelmann

*Wolffia Columbiiana*, Karst.

subisimma, major, sphacelata, grandicellulosa  
color, stomatibus paucissimis; riva tenuis-  
sima margine obscuriore vincta; et

*Wolffia Brasiliensis*, Wedd.

var. *borealis*

naturae, minor, oblonga, ante subarcta, pari-  
cellulosa, densior, supra lacte virens, subbas  
pallida, plus minus bruno-maculata, stoma-  
tibus plurimis; riva tenuis, color (si  
verticillata compressa) vel margine superiore  
recto obscuriore (si a latere compressa).

In lacu quadam inter Springfield et  
Athens in Illinois ventrali, abunde cum  
Lemnus, Ceratophyllum, Anacharis, etc.

Leg. Elihu Hall, Sept. 1867.



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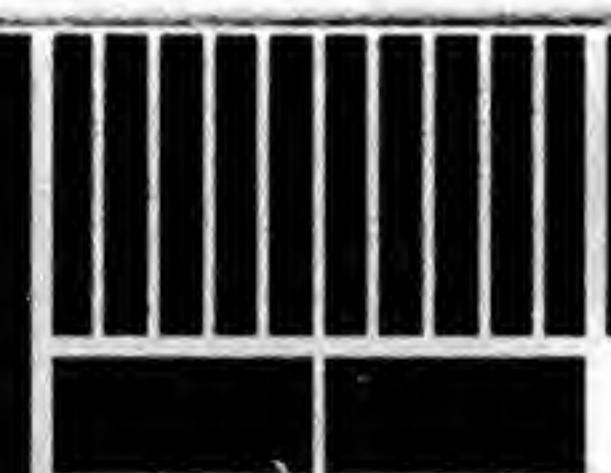
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wolffii

1839

Lemnacee Schleid. - Linnaea 13. p. 388

wolffii Micheli Schleid. : labium inferius sime  
bas. tarsis productum appensum hyaline  
frontale tenuissimum ~~longitudine~~  
Cossin & Germi. Flora de L'Am. 1861

p. 716 Wolffia arrhiza (Lemnaceae Lin)

W. Micheli Schleid.

Frondes subglobos lenticelles, posse places en  
dessus, les roulées en dessous - la feuille  
généralement à lèvres entières  
embrassant étroitement le jeune fond

Gouy Man 3<sup>e</sup> édit 1867

p. 480 Wolffia Columbiana Kuntze. Frond lenticulaire  
la chink at the base appendage by an  
expanded hyaline border.

over



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Kunth vol 3 p. 4 over

has nothing satisfactory about

*Lemna* ~~sign~~ L is still,  
with him, as with Schleid  
allied to *L. y. Oba!* never  
flowers seen

wolffia-ditum <sup>& Brissi-</sup> Wlp Am. 3. 496

*Lemna* Form London. 9. 267  
a tab (no)

W. Columbiana Karsten's Colas Naturwach

1. p. 103. c. Tct.

W. wolffia-ditum Hegelius. Form. Joan

Bot. 1865 p. 114

W. Brissioides Weddell. Ann Sc. Nat. 3<sup>rd</sup> Ser  
XII. 169. t. 8



786



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Dimensions in millimetres

	Length of single frond	Length of stomata & their cells
<i>W. antiguana</i> , Paragu	0.6 - 0.8 mm	0.032 - 0.035
<i>W. Brasiliana</i> var. Eugia	0.4 - 0.8 mm	0.016 - 0.017
-	An. bor. 0.5 - 1.0	0.023 - 0.026
	0.7 - 1.2	0.025 - 0.028
<i>W. Columbianum</i>	0.6 - 1.5	0.034 - 0.036
<i>W. Welwitschii</i> Cuba	4.0	none



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Leitch & Corlies

W. M. LEITCH & SONS

South West  
Corner Fifth  
and Market  
Streets.



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Karsten, Botan. Notizen ueber - T p. 103

Wolffia Columbiana a. sp. kraft und drifftlos, und  
mit einer Blattöffnung auf der

W. Brasiliana Wed. mit verzweigten Driften und  
mit der folgenden mit vielen Blattöffnungen

W. arrhiza Wace atmet borsig - sonstig.

" " habe' eine solche verfertigt die fast gleich  
sieht aber weniger als W. Columbiana.

Regensburg Oct 3  
1867



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7868

Eugene L. Massot,

DISPENSER OF

PURE MEDICINES,  
THE FINEST CHEMICALS,

And Reliable Pharmaceutical Preparations,

CORNER OF FOURTH AND SPRUCE STREETS,

St. Louis, Mo.

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top view

*Cebesia  
producta*



section

flowering "Wolffia Schleiden" siphon  
Schleiden in Schriften photograph  
magnif.  
frondosa ovules Tenuissime (Schleiden)

Wolffia antisetae see Hoffmann Annal  
Soc. Nat. 2<sup>2</sup> Ser t. 14 p. 226



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ENNO SANDER & CO.,  
PHARMACEUTISTS,

Cor. 2d & Walnut, under Barnum's Hotel,  
Cor. 4th & Walnut, under Southern Hotel,

ST. LOUIS, MO.

M. BOTANICAL  
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*Aug 24*  
Wolffia antigua flatfish or rather slightly  
convex, green, and full of stomata above,  
ventrally pale below; rather sharp  
on the posterior edge; rima circular,  
closely adpressed.

a. Opuntia, Europea: without  
brown spots; stomata 20-30, deep  
B. maculata, American, <sup>Bordeaux</sup> dotted with  
brown spots; stomata 30-100 - Orange Co.  
S. Deltoid - with the next.

Wolffia Coleombacea Karst. Nearly globose, <sup>barely</sup>  
not flat above, uniformly very pale green  
all over, with very few (3-6) stomata. rima  
circular, closely adpressed - larger than last.  
Orange Co. S. Deltoid, shores.



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**P H A R M A C E U T I C S,**  
**E N N O S A N D E R & C O.,**  
Cor. 4th & Walnut, under Southern Hotel,  
Cor. 2d & Walnut, under Barnum's Hotel,  
ST. LOUIS, MO.

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1870

Limber Berry or Drotter  
Bitter Root  
Marrow Root  
Burdock  
min. Leaves triangular  
blowing black, Jim Morris' name  
John Henry, and Purple Worm  
Jew's Worm  
John May, John J. Galloway  
Parchment Flower, Garden  
Flower Garden



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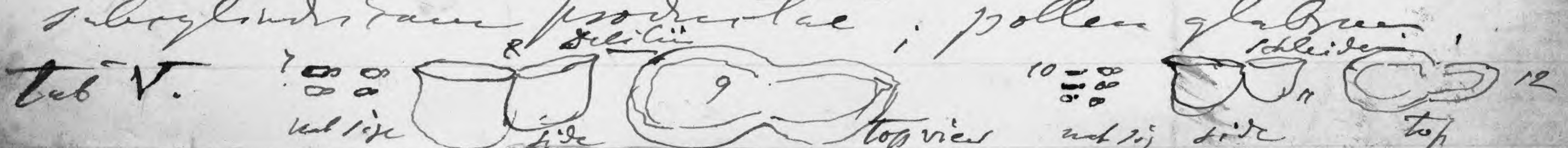
JVN Journal Linnean Society vol 9. no 37. June 1866  
pag. 265

1. Wolffia Schleid. Linn 19. 389. eti. frondosa angustifolia  
 $\frac{1}{4}$  lin longa, oblongo-globosa, supra stomatifera convexior  
sablosa globosa efflata, base irregulariter hexagono-cellulosa  
regularis

a. Schleid. frondosa diplo triplor majoribus, superficie  
magis levata? granulosa globosa griff. not. p. 229. t. 267.2

b. Schleid. frondosa  $\frac{1}{4}$  lin magis magis cylindrica  
superficie rugosa convexis rotulae (Wolffia Schleidi Mig.)  
(Kamnglobosa Rab)

2. W. microscopica Kutz Granular microscopica Griffith  
not. 226. t. 266 - 268 frondosa cream vit excedens  
cellulosae supra planis rotulae tabulas in radulae (?)  
subcylindrica protracta; pollen glabrescens



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Why is this at Wanchia? "Wanchia" is "transmissum"

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ENGELMANN  
GEORGE



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*Wolffia "Welwitschii"*

Cuba

246

41

BI-MONTHLY SUMMARY OF SCIENCE.

3. — Monthly mean of relative Humidity.

MARCH.

YEAR.	AT						MEAN OF MONTH.
	6 A.M.	9 A.M.	12 M.	3 P.M.	6 P.M.	9 P.M.	
1861.....	83.3	63.7	58.9	52.4	58.9	70.1	64.5
1862.....	85.1	76.2	64.4	60.4	65.5	73.0	70.8
1863.....	87.7	71.5	57.8	55.4	63.0	73.0	68.1
1864.....	85.6	69.5	59.3	58.8	68.8	78.1	70.0
Mean .....	85.4	70.2	60.1	56.7	64.1	73.5	68.3

APRIL.

1861.....	77.4	62.4	53.2	51.7	57.3	67.2	61.5
1862.....	82.0	68.3	57.3	55.9	63.0	75.8	67.0
1863.....	76.5	57.8	46.9	43.9	53.0	65.4	57.2
1864.....	85.1	72.7	62.2	57.6	63.2	77.8	69.8
Mean .....	80.1	65.3	54.9	52.3	59.1	71.5	63.9



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BI-MONTHLY SUMMARY OF SCIENCE.

III.—ATMOSPHERIC ELECTRICITY, TEMPERATURE  
AND HUMIDITY.

*Observations made at St. Louis, Mo., based upon daily observations  
at 6, 9, 12, 3, 6 and 9 o'clock, from morning till night. By A.  
WISLZENUS, M. D., Saint Louis, Mo.*

1.—*Monthly mean of positive Atmospheric Electricity.*

MARCH.

YEAR.	AT 6 A. M.	9 A. M.	12 M.	3 P. M.	6 P. M.	9 P. M.	MEAN OF MONTH.	NO. OF THUNDER STORMS.	PREVAILING WINDS.
1861.....	12.0	12.0	9.8	8.1	9.0	8.0	9.8	3	W. & S.E.
1862.....	11.8	12.8	9.4	8.4	7.0	6.8	9.4	4	W., S.E. & N.W.
1863.....	15.8	15.5	16.5	10.4	11.1	12.3	13.6	2	NW. W. N.E. S.E.
1864.....	9.1	11.6	6.8	7.5	7.8	8.0	8.5	3	S.E.
Mean.....	12.2	13.0	10.6	8.6	8.7	8.8	10.3	....	....

APRIL.

1861.....	10.8	11.1	7.1	7.0	7.7	9.3	8.8	2	S. & W.
1862.....	10.7	13.7	10.6	9.1	9.4	10.1	10.6	6	SE., NW. & NE.
1863.....	10.0	9.9	10.0	6.2	8.0	8.6	8.8	2	S.E. & N.W.



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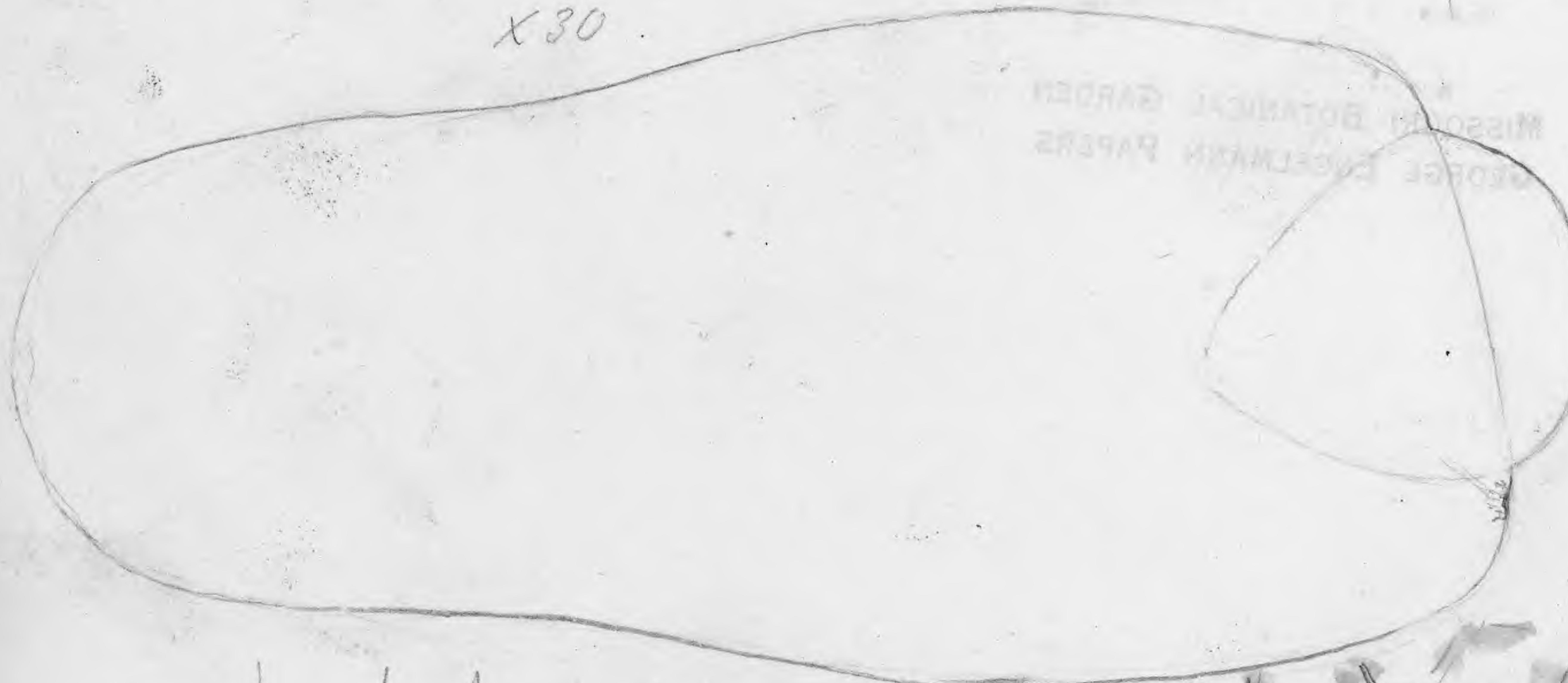
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*Wolffia 'McClintochii' Hegler* July 4 1867  
W. brasiliensis C. F. Bust in Cott.

front extremely thin

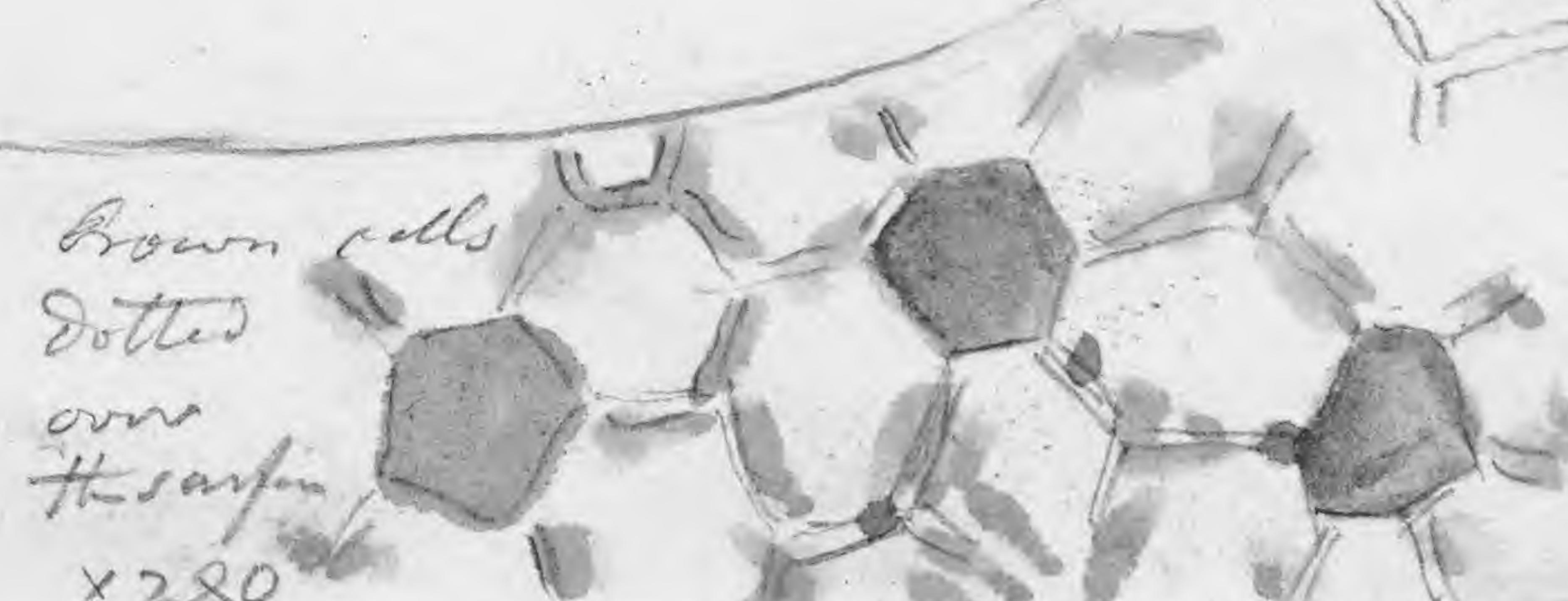
Cuba, Edgmont mixed with 3215  
(*Lemna paucisili*)

X 30

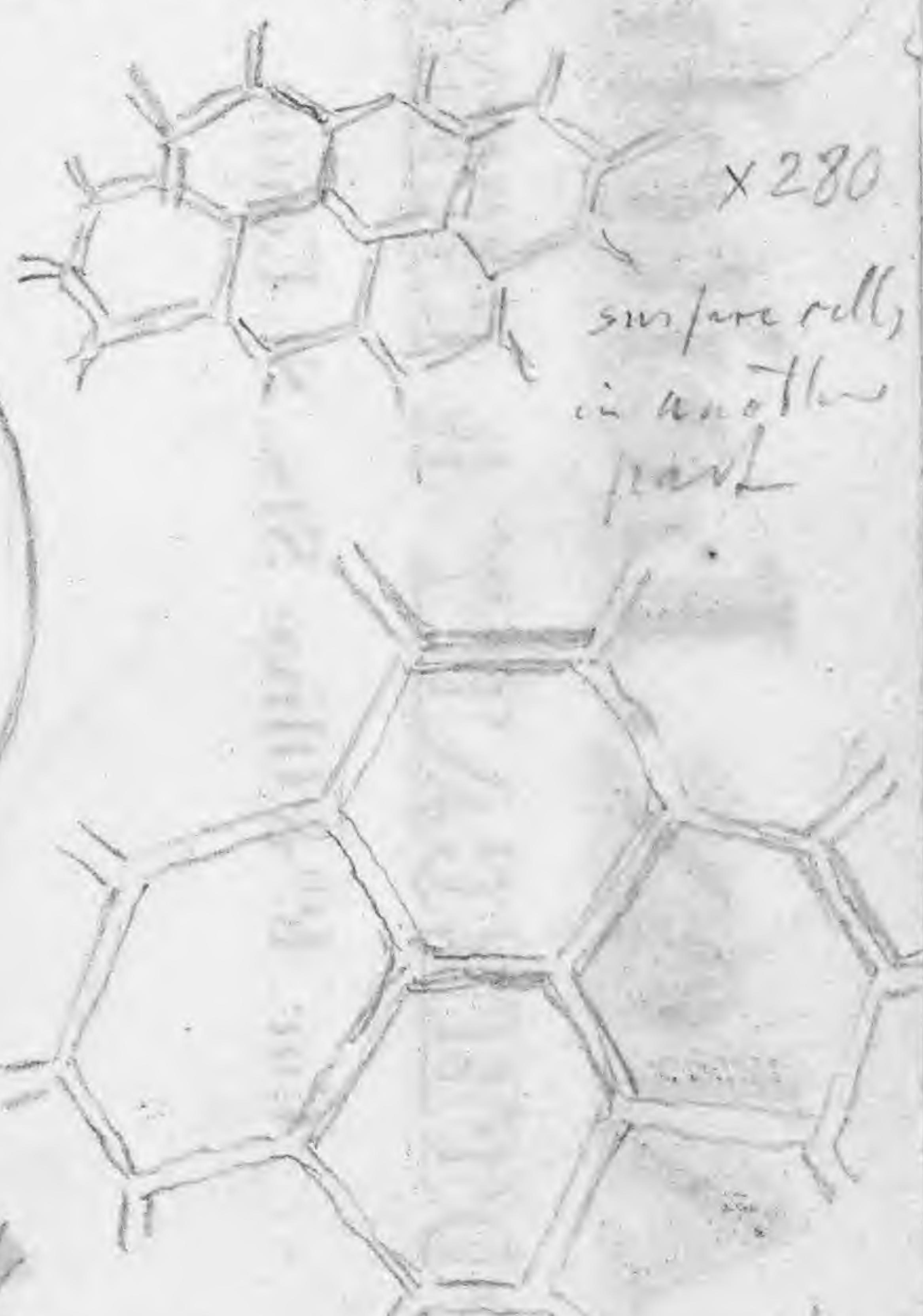


Thin margin of front X 280

Brown cells  
dotted  
over  
the surface  
X 280



middle  
cells on surface  
X 280



X 280

surface cells  
in another  
part



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ALEX. LEITCH,  
APOTHECARY & CHEMIST,

Cor. 4<sup>th</sup> & Olive Sts., St. Louis.

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*Wolffia wilmotiana*

wright, Cuba

with Lemna

x30

Sept 13 1867



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*Wolffia caroliniana*  
Europaea

43-4

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BI-MONTHLY SUMMARY OF SCIENCE.

3.—Monthly mean of relative Humidity.

MARCH.

YEAR.	AT						MEAN OF MONTH.
	6 A.M.	9 A.M.	12 M.	3 P.M.	6 P.M.	9 P.M.	
1861 . . . . .	83.3	63.7	58.9	52.4	58.9	70.1	64.5
1862 . . . . .	85.1	76.2	64.4	60.4	65.5	73.0	70.8
1863 . . . . .	87.7	71.5	57.8	55.4	63.0	73.0	68.1
1864 . . . . .	85.6	69.5	59.3	58.8	68.8	78.1	70.0
Mean . . . . .	85.4	70.2	60.1	56.7	64.1	73.5	68.3

APRIL.

	6 A.M.	9 A.M.	12 M.	3 P.M.	6 P.M.	9 P.M.	
1861 . . . . .	77.4	62.4	53.2	51.7	57.3	67.2	61.5
1862 . . . . .	82.0	68.3	57.3	55.9	63.0	75.8	67.0
1863 . . . . .	76.5	57.8	46.9	43.9	53.0	65.4	57.2
1864 . . . . .	85.1	72.7	62.2	57.6	63.2	77.8	69.8
Mean . . . . .	80.1	65.3	54.9	52.3	59.1	71.5	63.9



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245

## BI-MONTHLY SUMMARY OF SCIENCE.

III.—ATMOSPHERIC ELECTRICITY, TEMPERATURE  
AND HUMIDITY.

*Observations made at St. Louis, Mo., based upon daily observations  
at 6, 9, 12, 3, 6 and 9 o'clock, from morning till night. By A.  
WISLZENUS, M. D., Saint Louis, Mo.*

1.—*Monthly mean of positive Atmospheric Electricity.*

## MARCH.

YEAR.	AT.					MEAN OF MONTH.	NO. OF THUNDER STORMS.	NO. OF PREVAILING WINDS.
	6 A. M.	9 A. M.	12 M.	3 P. M.	6 P. M.			
1861.....	12.0	12.0	9.8	8.1	9.0	8.0	9.8	3
1862.....	11.8	12.8	9.4	8.4	7.0	6.8	9.4	4
1863.....	15.8	15.5	16.5	10.4	11.1	12.3	13.6	2
1864.....	9.1	11.6	6.8	7.5	7.8	8.0	8.5	3
Mean.....	12.2	13.0	10.6	8.6	8.7	8.8	10.3	....

## APRIL.

1861.....	10.8	11.1	7.1	7.0	7.7	9.3	8.8	2
1862.....	10.7	13.7	10.6	9.1	9.4	10.1	10.6	6
1863.....	10.0	9.9	10.0	6.2	8.0	8.6	8.8	2

S. & W.								
SE., NW. & NE.								
S.E. & N.W.								



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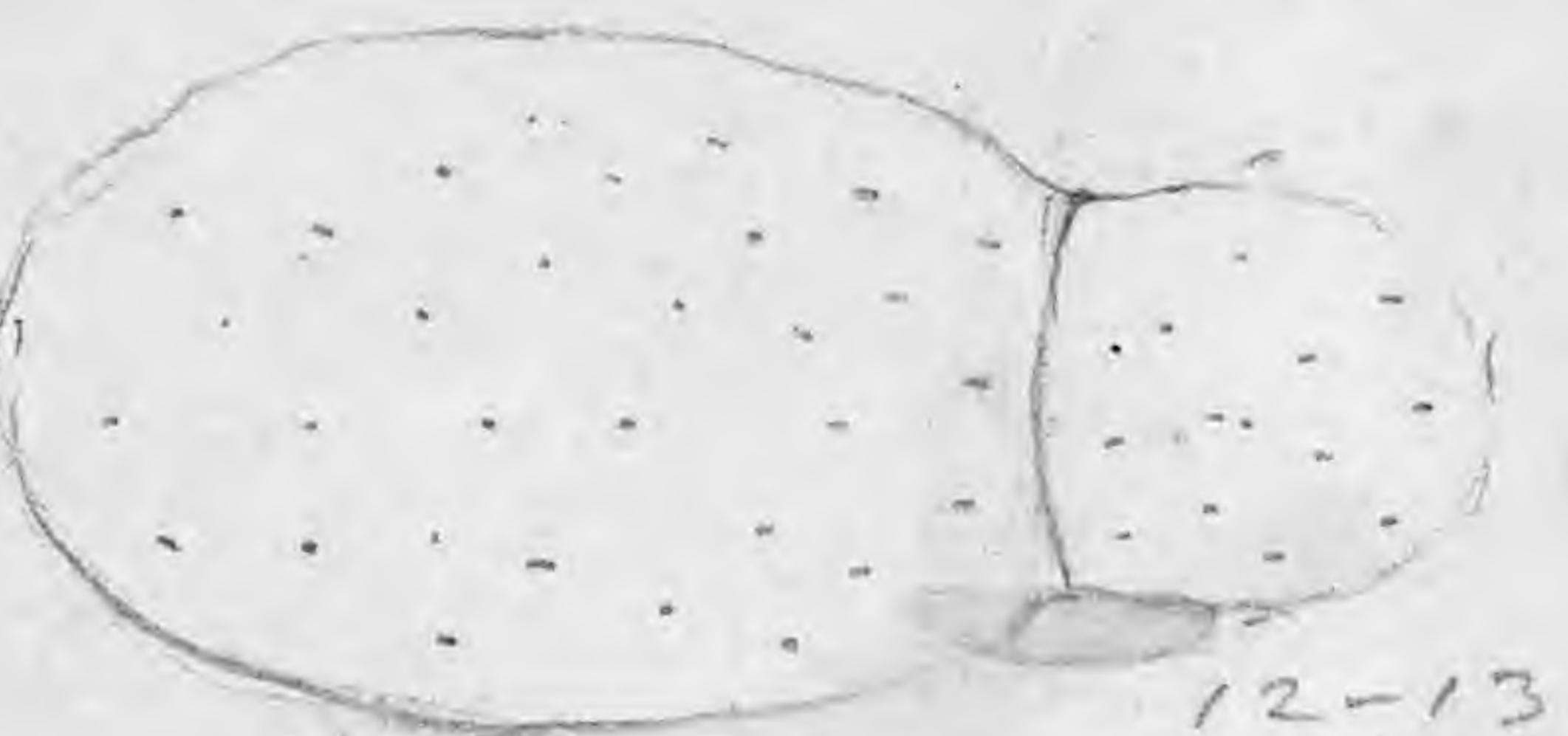
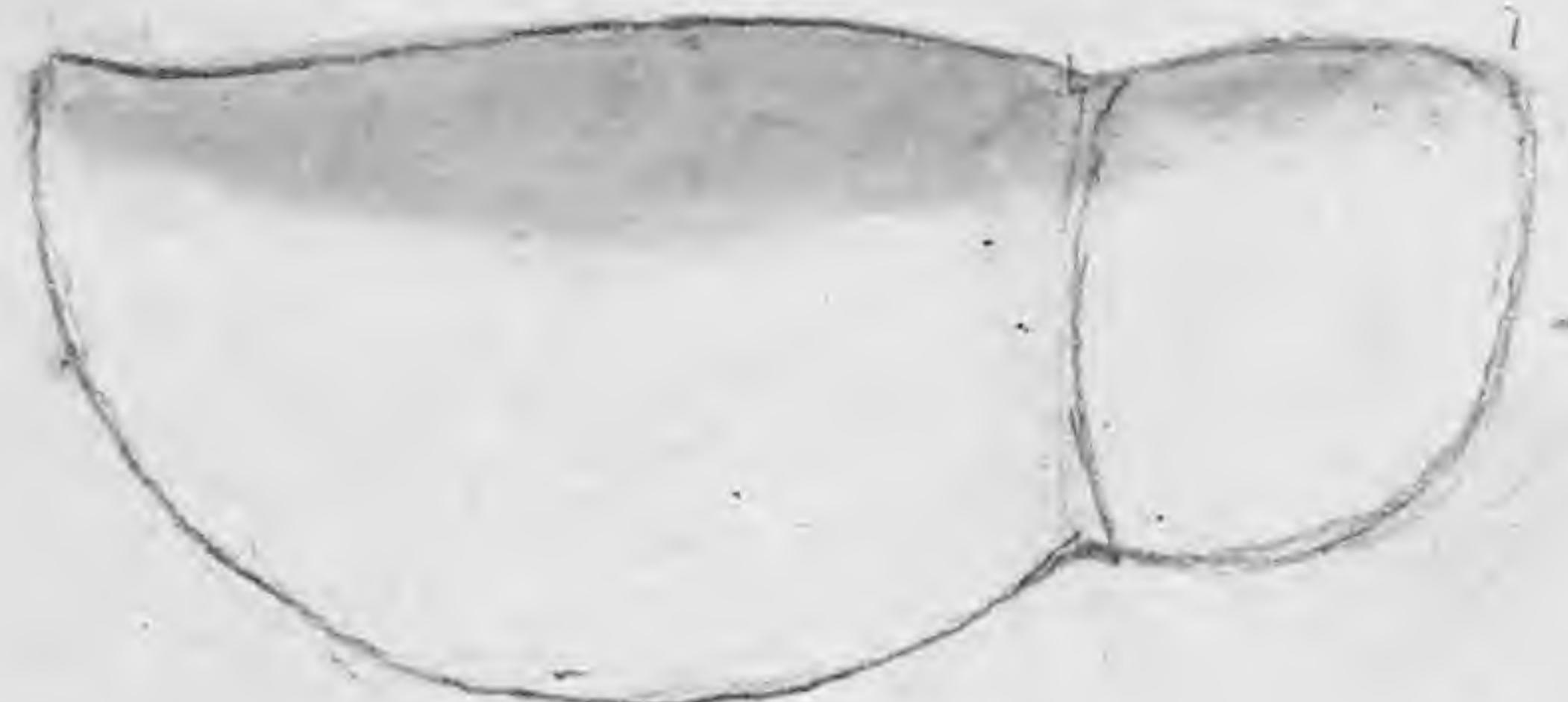
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x30

*Wolffia arrhiza*  
Leipzig

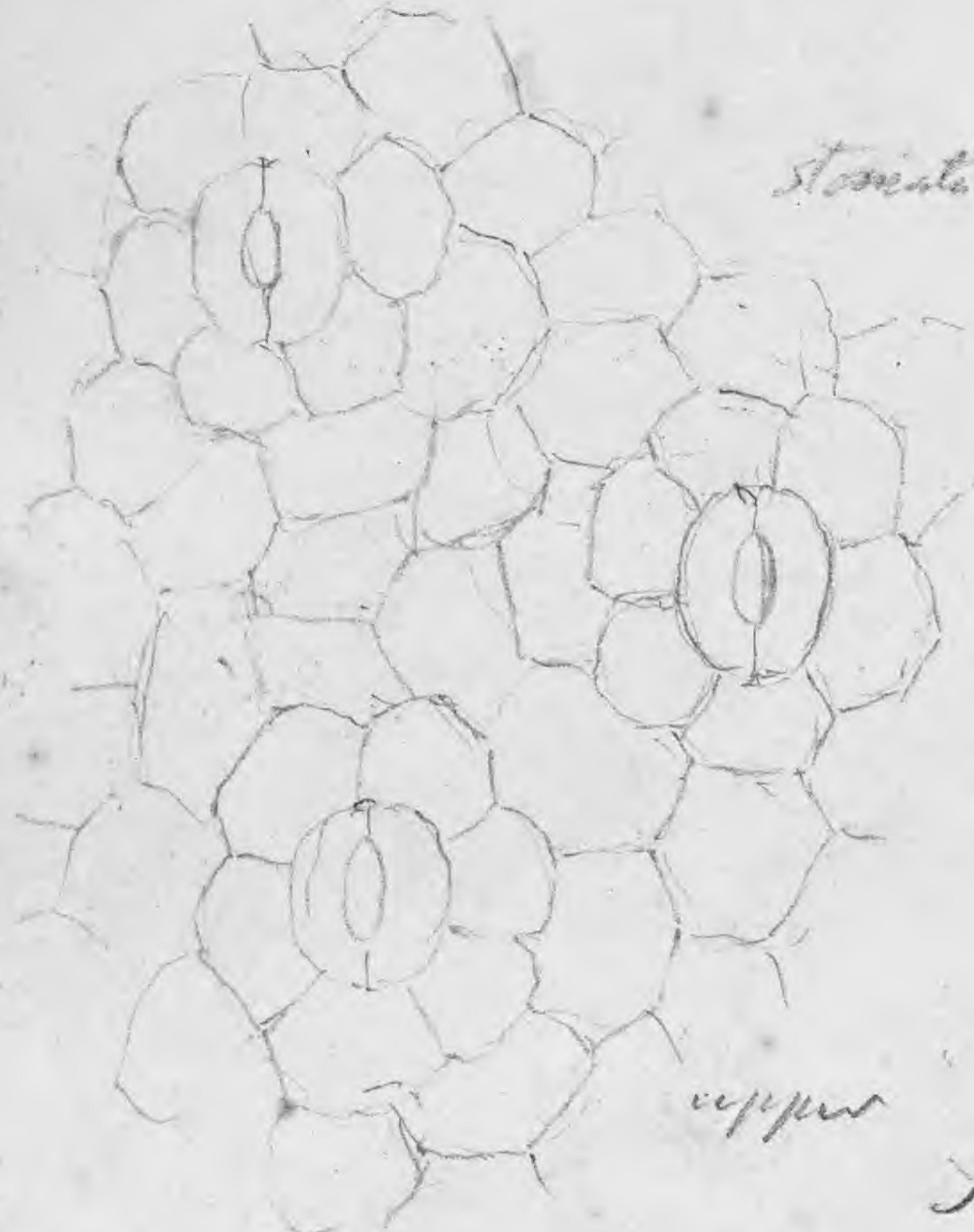
May 24

1867



12-13  
25-30 stomata Stom.  
no brown spots

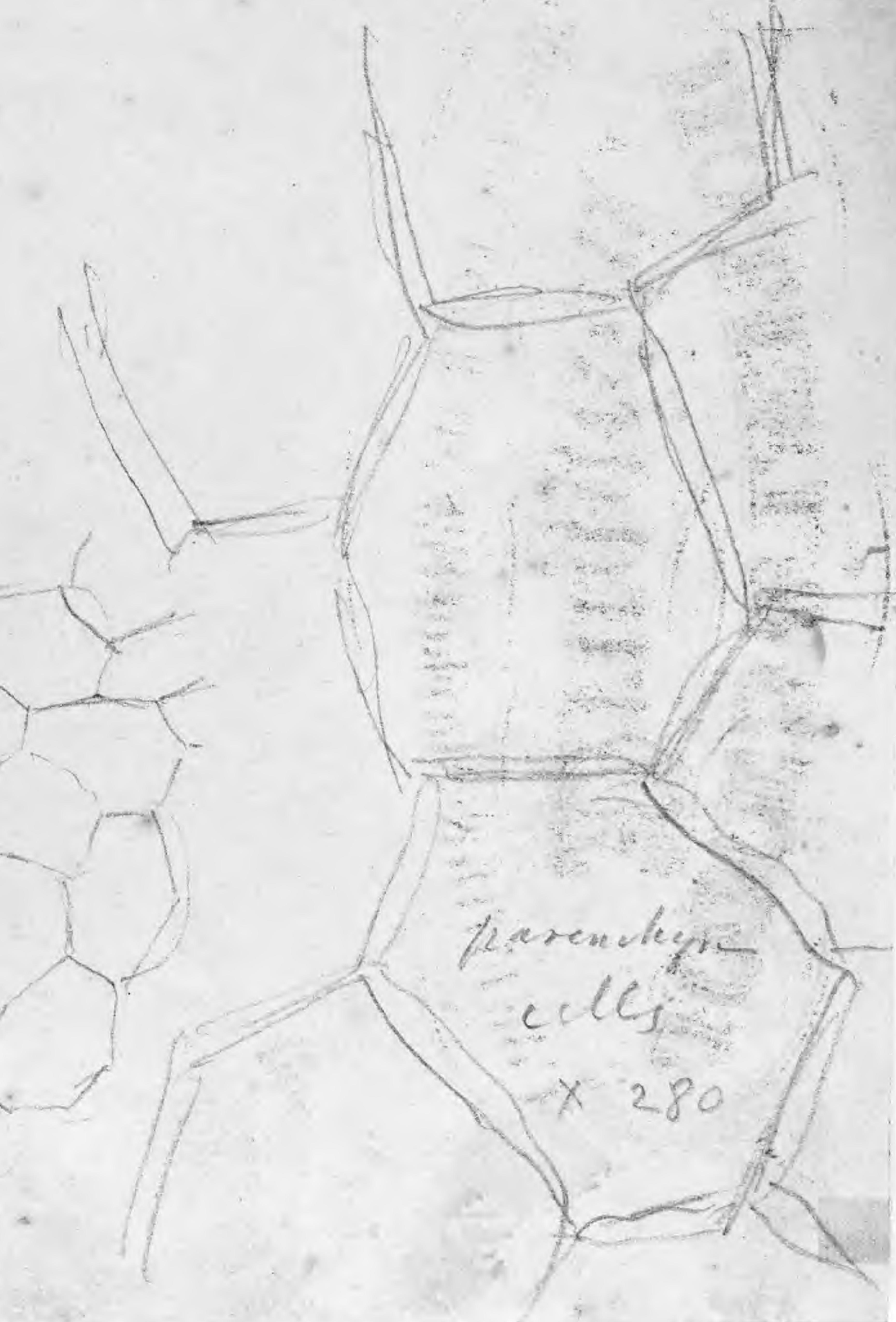
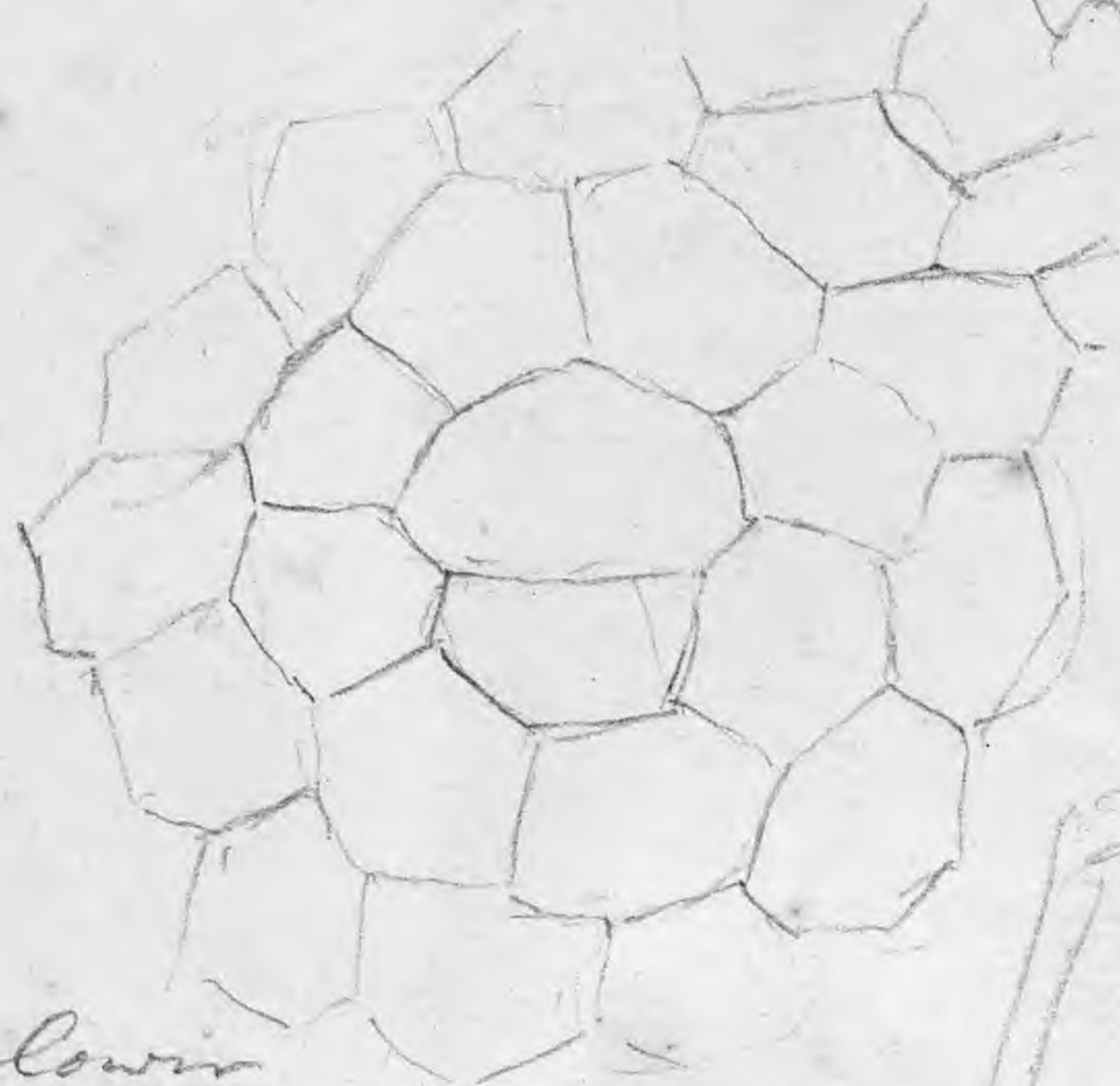
stomata 0.035 mm<sup>2</sup>



upper

lower

Tanfer x 280



0 1 2 3 4 5 6 7 8 9 10  
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J. McElroy & Co. 36 N Main St.



0 1 2 3 4 5 6 7 8 9 10  
cm

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MISSOURI  
BOTANICAL  
GARDEN

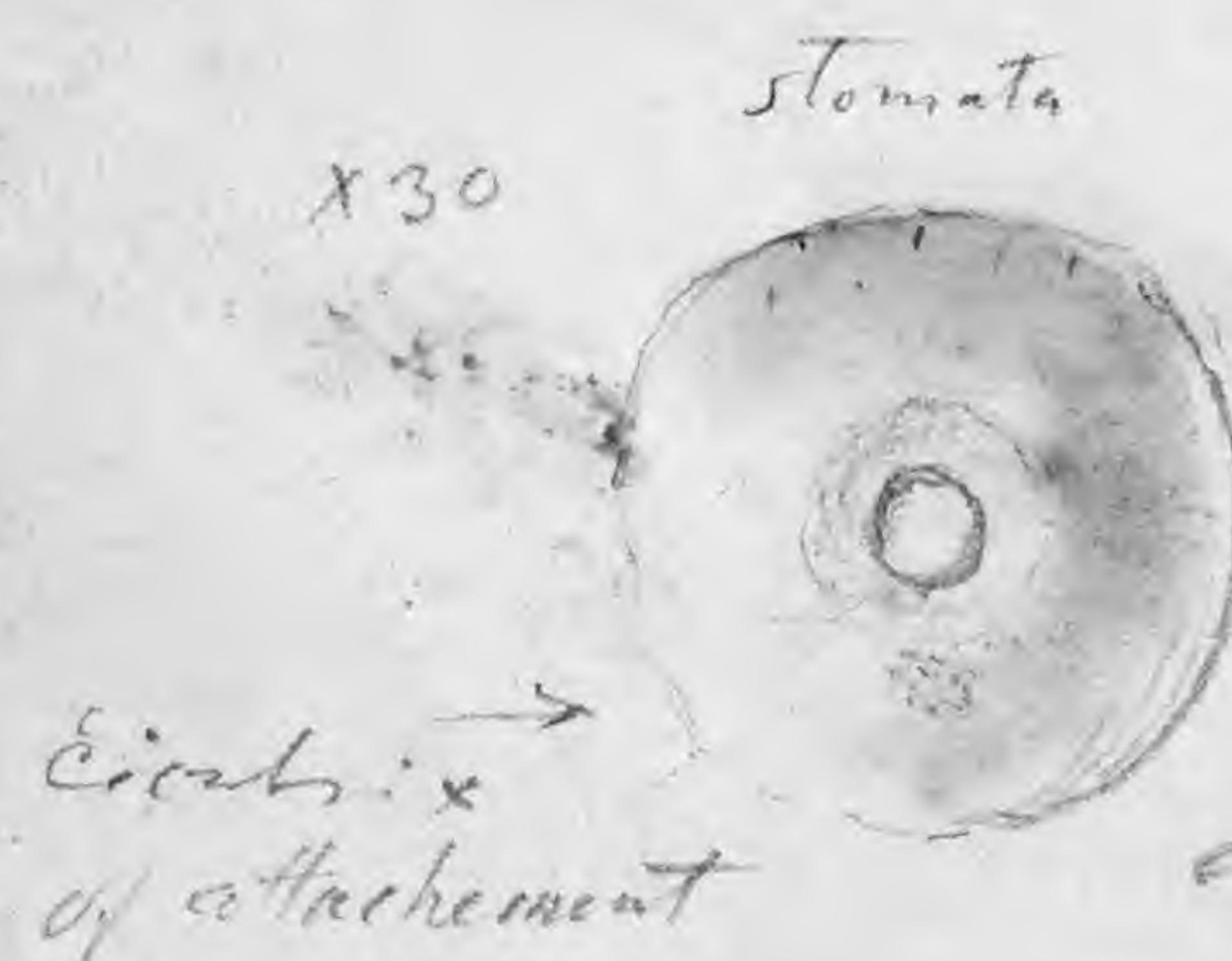
*Wolffia arrhiza*

Bordeaux

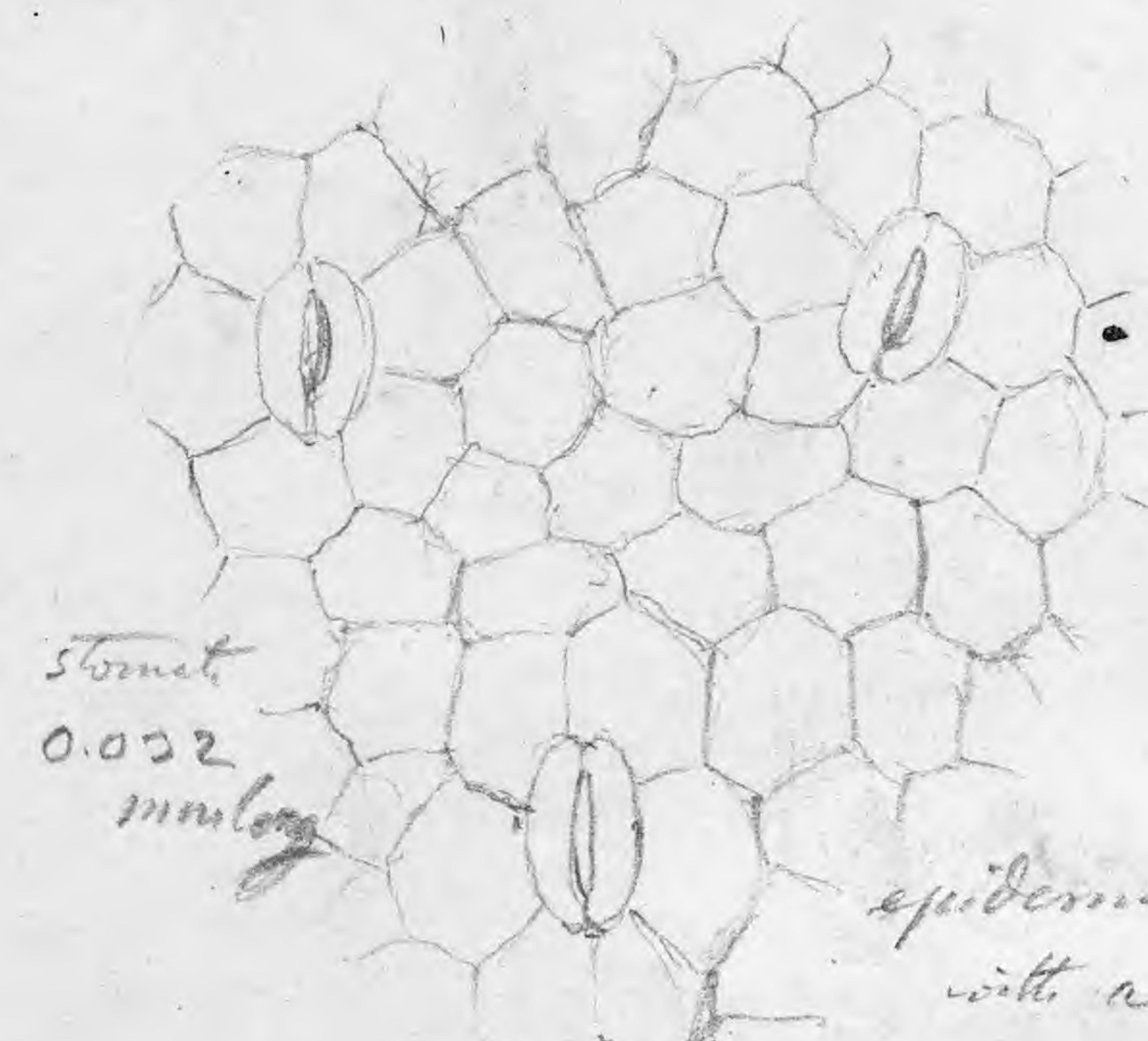
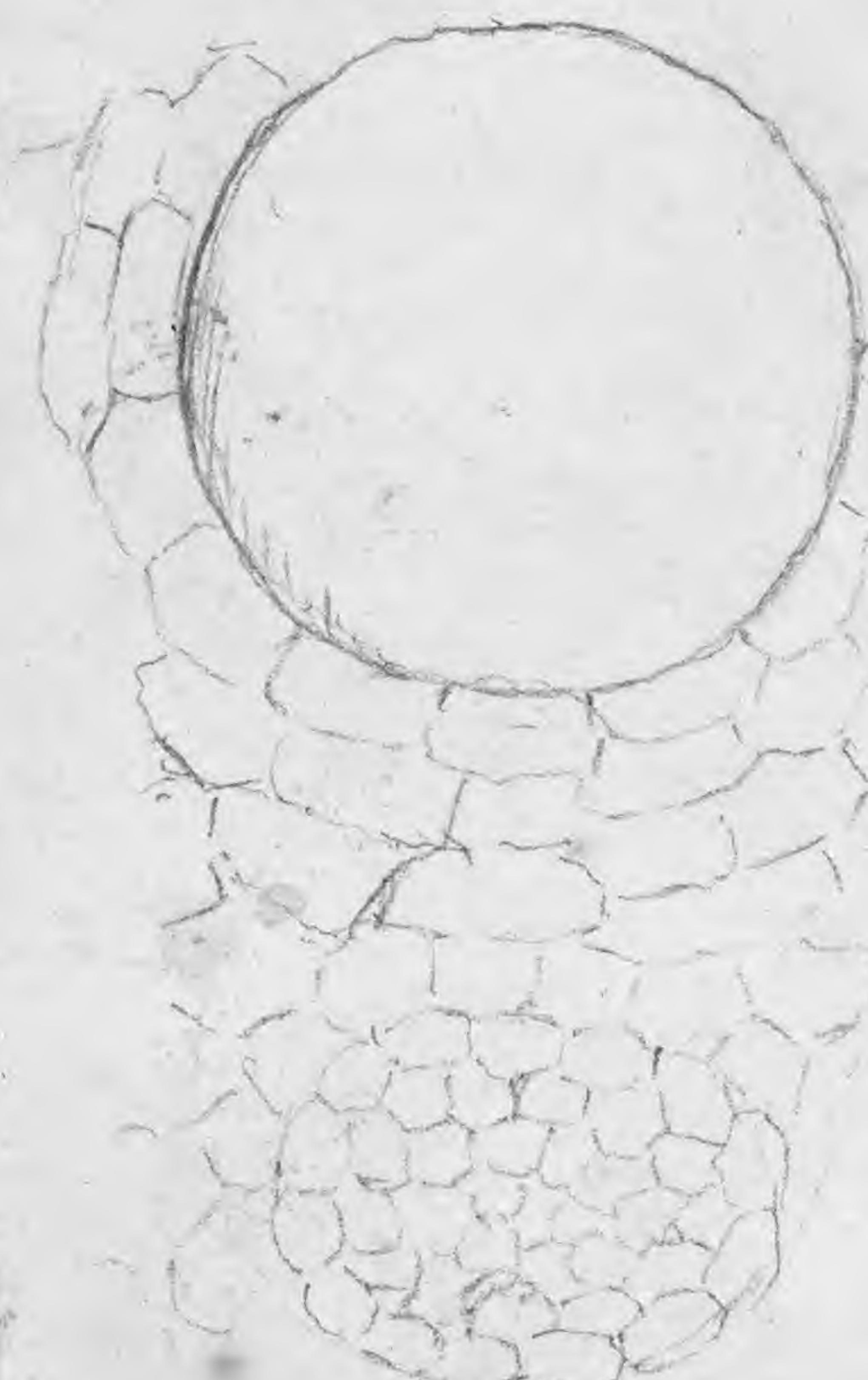
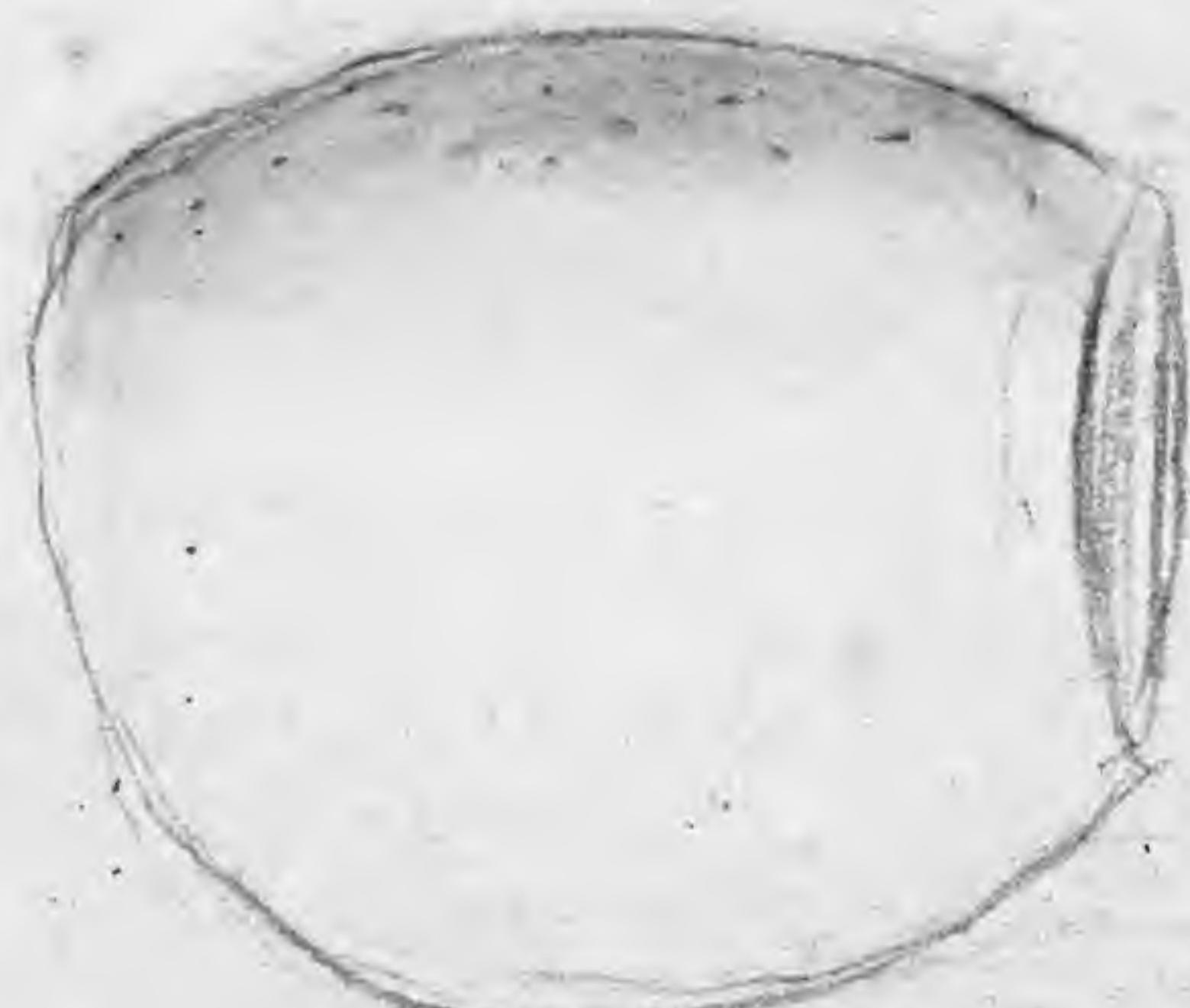
Casson

Aug 23 - 24

1867



a young  
globose  
specimen  
very pale  
at transparent  
Cicatrix →  
of attachment



air cavities in  
other layers  
parenchyma cells  
epidermis <sup>upper</sup> of surface x280  
with about 25 stomata x280

upper surface green; lower transparent



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cm

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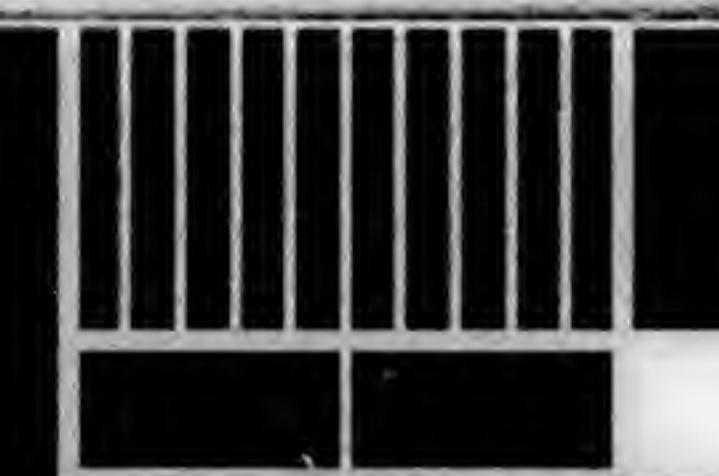
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GARDEN

7877

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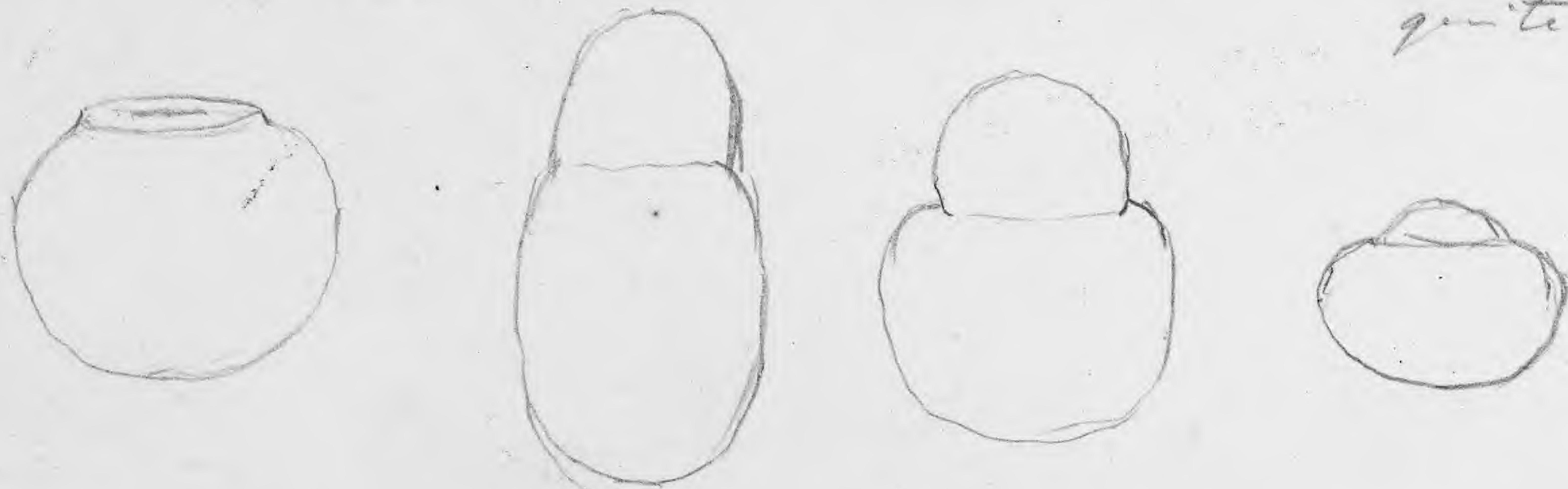
*Wolffia arrhiza*

July 4, 1867

Bordeaux, Cesson mis.

Ioakim x30

quite transparent, green



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cm

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*Wolffia arrhiza*

July 5 1867

different species

Leaves, Brown

well soaked, x 30

opaque, blackish



after treating these plants with  
polish they become more green,  
fuller, and a little larger



0  
cm

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cm

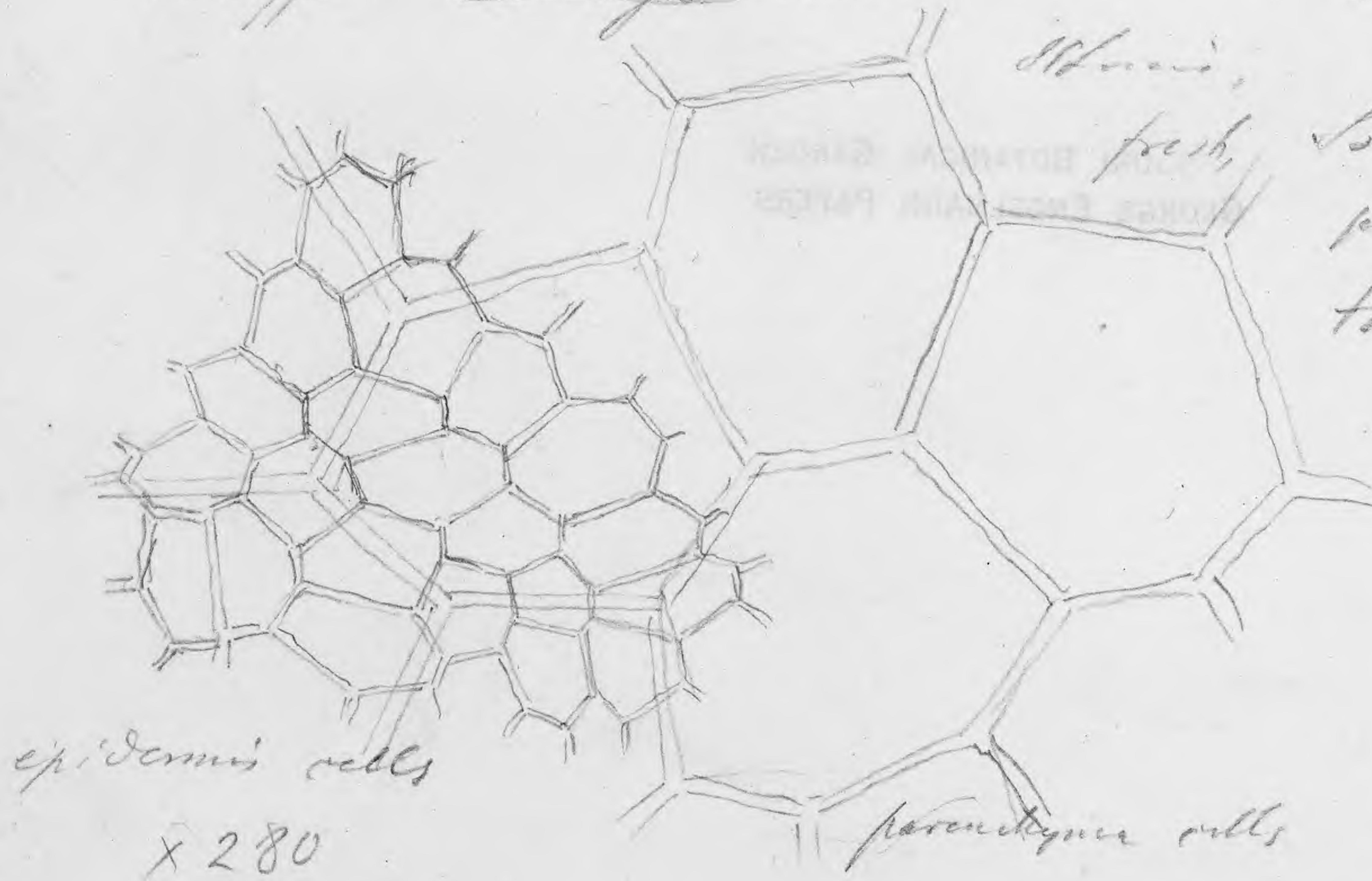
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*Wolffia arrhiza* Columbian

July 5 1869



0  
cm

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cm

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